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PATENT
Docket No. 44912009400

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Stephanie R. Mason

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Patent Application of:
Paul W. BAIER et al.

Application No.: 09/889,518

Art Unit: 2631

Filed: August 27, 2001

Examiner: K. Tran

For: METHOD FOR OBTAINING INFORMATION
REGARDING INTERFERENCE IN THE
RECEIVER OF A MESSAGE TRANSMISSION
SYSTEM

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APPELLANT'S REPLY BRIEF

MS REPLY BRIEF-PATENTS
Commissioner for Patents
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Sir:

I. INTRODUCTION

Pursuant to 37 CFR 1.193(b), Appellant submits this reply in response to the Examiner's Answer. Appellant respectfully submits that the Examiner's assertion are incorrect as a matter of law and/or fact. Thus, for the reasons set forth below and for the reasons set forth in Appellant's Appeal Brief, Appellant respectfully requests that the Board reverse the rejection of Claims 1-2, 17 and 27 under 35 USC 102(e); claims 3-5, 8-13, 16 and 18-22 under 35 USC 103(a).

II. REMARKS

In the Examiner's Answer, referring to the section entitled "Response to Argument" beginning on page 11, the Examiner begins by contending in (a) that Smith teaches, in Figure 7, a protocol employed by a base station and mobile unit to communicate data there-between, and, in Figure 8, another protocol employed by a first base station and a second base station. In this regard, the Examiner states that, contrary to Applicant's assertions, the term user signals are signals (including training signals) transmitted from a user and received at a receiver.

Appellant's respectfully disagree with the Examiner. According to the invention, quantitative information about received user signals is obtained. The user signal is a signal not known to the receiver. During the antenna steering process of Smith, user data (which is not known to the user) is not dealt with. For adjusting the adaptive antennas, training sequences (known by the user) are exclusively applied (steps 704 and 804 in Figures 7 and 8). The transmission of valid data (which is data known by the receiver, therefore termed "valid") occurs after the end of the steering procedure. Hence, Smith's valid data is not a basis for gaining quantitative information in the steering procedure. In fact, Smith does not reveal obtaining quantitative information about received user signals at all.

The Examiner then asserts, in (b), that Smith discloses the adaptive antenna of the present invention implemented as a beam steering algorithm that is *based on two interference indication signals: the BER and the RSSI*. In this regard, the Examiner posits, the BER and RSSI are representative of quantitative information about the received interference signals, and both BER and RSSI are generated based upon a received antenna training sequence, which is a received user signal.

Again, Appellant's respectfully disagree with the Examiner. Focusing on the portion of the claims reciting obtaining quantitative information about the received interference signals from the received signals of the receiving antennas and the quantitative information obtained about the received user signals, Smith clearly does not disclose these features. That is, Smith does not disclose BER and RSSI being obtained from received signals. Rather, BER and RSSI are obtained independently. For example, Smith states that the "bit error rate is simply the ratio of the number of bits in error received and the number of correct bits received." (col. 4, lines 7-9), and the "received signal strength indicator is approximately equivalent to the ratio of the signal power to the noise power." (col. 4, lines 23-25). As clearly shown in Figure 2, arrows 206 and 210 show no dependency between obtaining BER and obtaining RSSI.

Moreover, as detailed above, it is simply not possible for Smith to obtain the quantitative information about the received interference signals using (1) the quantitative information obtained about the received user signals and (2) the received signals because the user signals are not known by the receiver, nor are they used, in Smith.

Turning to the Examiner remarks in paragraph (c), the Examiner argues that Smith includes a high data rate communication system including *an antenna subsystem for receiving and transmitting data*, and Figure 4 shows a transceiver employing *an antenna controller 38 coupled to a modulator to drive the antenna subsystem 400 for transmission (i.e. steering process)*. Finally, the Examiner points to Applicants specification, on page 29 of the Preliminary Amendment, as an admission that the multi-antenna systems are used for receiving and transmitting information about the received interference, and can be used for driving the antennas in transmitting.

Applicants again respectfully disagree with the Examiner's reading of Smith. Smith clearly discloses multiple paragraphs in which the steering process of an antenna is used solely at ameliorating the *reception of signals* through the antenna. For example:

1) Col. 5, lines 6-11: "instructs the beam steering state machine to **steer or re-steer the antenna** to a source of data. As described herein below, the data source (transmitter) sends a timing sequence which is data specifically designated by the system and employed by the beam steering state machine **to steer the antenna to the data source.**" (emphasis added). In this regard, the "data source" is not termed data source because it transmits the timing sequence (i.e. the training sequence), but because it has data to transmit (figure 8, 812: "transmit valid data", figure 7, 714: "valid **data** is transported between BS and MU"). The data transmission takes place after the end of the steering procedure and for the sake of the data transmission, the antenna of the receiver (which was aligned during the steering procedure) is directed towards the data source.

2) Col. 5, lines 17-19: "VALID_DATA signal can be employed to indicate to the system that **data reception** can begin." (emphasis added). VALID_DATA is a signal of the ANTENNA CONTROLLER 38 of figures 1 and 2, which is responsible for controlling the steering process. The steering procedure is terminated by the signal VALID_DATA, after which the reception procedure making use of the steered antenna can begin. Nothing in Smith states that the data transmission of the (steered) antenna controlled by the ANTENNA CONTROLLER can begin after the end of the steering procedure.

3) Col. 6, lines 14-16: "The **receiver block** provides the demodulated data to a baseband unit if the VALID_DATA signal is asserted." (emphasis added)..

4) Col. 6, lines 41-43: “**receiving data** from the baseband unit when the VALID_DATA signal is asserted.” (emphasis added).

5) Col. 7, lines 23-33: “Accordingly, a continuous acquisition ensures that as the communication channel changes, **the receiver** adapts to these changes...since the antenna can be steered to **receive** a reflected signal...the antenna can **receive** that reflected signal which is of a higher quality than a direct signal that is being blocked by the object.” (emphasis added). This clearly shows that the steering process is only performed by the receiver. Rather, the receiver may adapt to a new shadowing effect by steering its antenna in a different direction so as to receive a better signal.

6) Col. 9, lines 28-32: “Once the first base station has steered its antenna to **receive** data from the first base station and the second base station has steered its adaptive sectored antenna to **receive** information from the first base station, data transfer can occur.” (emphasis added). This clearly shows that the steering is used only for reception. Transmission is performed not by the adaptive antennas 614 and 624, but by the omnidirectional antennas 612 and 622. This is shown from col. 9, lines 19-27. This is done since in the data transmission which follows, the base stations exclusively use their omnidirectional antennas. Hence, the respective receiver base station can steer its adaptive antenna into the direction of best reception of the omnidirectional antenna of the transmitter base station. In contrast, if the base stations would use their (steered) adaptive antennas for transmitting data, these antennas should be used for transmitting the training sequence.

7) Col. 10, lines 41-43: “to focus, and to **converge on one of the users and reject signals from all other users** in the environment.” (emphasis added). This only applies to using the steering mechanism for the receiver, not the transmitter.

Finally, the Examiner, in (d), generally comments that the “transceiver utilizes the quantitative information about the received interference signals to also generate a directional pattern for transmission.” However, the Examiner does not appear to provide any evidence to support this statement. Rather, he merely recites his arguments found in (c).

Accordingly, the Appellants submit that the required criterion for teaching all of the elements of a claimed invention as required under 35 USC 102 and 103 have not been met by the rejections of record. In light of the foregoing, the Appellants submit that the Examiner is in error in fact and in law in rejecting the claims of the application. Reversal of the rejections and allowance of all claims are therefore respectfully requested.

CONCLUSION

For the foregoing reasons, Appellants submit that the pending rejections should be reversed. Appellant’s respectfully request that this Board reverse the outstanding rejections imposed by the Patent Office.

In the event the U.S. Patent and Trademark office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing docket no. **449122009400**. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

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Respectfully submitted,

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Appendix

1. A method for the wireless data transmission using at least one transmitter and at least one receiver, the receiver having one or more receiving antennas comprising:

utilizing information on received interference signals to improve the quality of transmission of the data transmission;

obtaining quantitative information about received user signals from the received signals of one of the antennas by using a first signal processing algorithm; and

obtaining quantitative information about the received interference signals from the received signals of one of the antennas and the quantitative information obtained about the received user signals by using a second signal processing algorithm wherein the quantitative information about the received interference signals is used to generate a directional pattern for transmission at the receiver.

2. The method as claimed in claim 1, wherein the first signal processing algorithm provides an estimate of the transmitted user data.

3. The method as claimed in claim 1, wherein the first signal processing algorithm provides an estimate of the characteristics of the radio channels operating between the transmitters and the receiver.

4. The method as claimed in claim 1, wherein the second signal processing algorithm includes algorithms to reconstruct the user signals received from the receiving antennas by the quantitative information obtained about the signals.

5. The method as claimed in claim 1, wherein the second signal processing algorithm includes a weighted or unweighted subtraction of the reconstructed received user signals from the total received signals.

6-7. (Canceled)

8. The method as claimed in claim 1, wherein the second signal processing algorithm includes a forming of the spatial covariance matrix of the received interference signals.

9. The method as claimed in claim 1, wherein the second signal processing algorithm includes a forming of the temporal covariance functions of the received interference signals at each of the antennas.

10. The method as claimed in claim 1, wherein the second signal processing algorithm includes a forming of the total covariance functions of the received interference signals.

11. The method as claimed in claim 1, wherein the second signal processing algorithm includes an estimating of the spatial, temporal and/or total covariance functions by finite temporal averaging over the received interference signals.

12. The method as claimed in claim 1, wherein the second signal processing algorithm includes an estimating of the directions of incidence of the interference.

13. The method as claimed in claim 1, wherein the second signal processing algorithm includes an estimating of the power and/or the spectral shape of the interference.

14-15. (Canceled).

16. The method as claimed in claim 1, wherein the first signal processing algorithm includes a forming of the spatial covariance matrix of the received user signals.

17. The method as claimed in claim 1, wherein the first signal processing algorithm is based on the principle of a single user detection in the case of data transmission.

18. The method as claimed in claim 1, wherein the first signal processing algorithm is based on a principle of multi-user detection in the case of data transmission.

19. The method as claimed in claim 1, wherein the first signal processing algorithm is based on a principle of a rake receiver in the case of data transmission.

20. The method as claimed in claim 1, wherein the first signal processing algorithm includes forward error correction decoding at the receiver end during data transmission.

21. The method as claimed in claim 1, wherein the first signal processing algorithm is based on a principle of the zero-forcing algorithm.

22. The method as claimed in claim 1, wherein the first signal processing algorithm is based on a principle of maximum-likelihood estimation or minimum mean square error estimation.

23-26. (Canceled)

27. A system for wireless data transmission, comprising:
a receiver having one or more receiving antennas utilizing information on received interference signals to improve the quality of transmission of the data transmission, wherein quantitative information is obtained about received user signals from the received signals of one of the antennas by using a first signal processing algorithm, and the quantitative information about the received interference signals is obtained from the received signals of one of the antennas and the quantitative information obtained about the received user signals by using a second signal processing algorithm wherein the quantitative information about the received interference signals is used for generating a directional pattern at the transmitter; and
a transmitter to generate a directional pattern based on the quantitative information about the received interference signals.